

Claim listing (amendments presented):

1. (Presently amended) A flexible scintillation-type radiation detector for use in combination with a source of gamma or ionizing nuclear radiation as a level sensing gauge, comprising:

an elongated flexible tube having first and second closed ends and defining therein a scintillation chamber, said tube being made of material selected from the group consisting of TYGON and CHEMFLUOR;

liquid scintillation material substantially filling the scintillation chamber;

said first closed end including a substantially optically-transparent first end closure member;

photodetection circuitry operably positioned relative to the first end closure member to quantitatively detect scintillating photons generated in the scintillation liquid indicative of radiation passing into the scintillation chamber; and

an opaque, flexible protective sheath substantially surrounding the flexible tube.

2. (Original) The detector of claim 1, further comprising an expansion chamber for accommodating volumetric expansion of the liquid scintillation material.

3. (Presently amended) ~~The detector of claim 2, A~~
flexible scintillation-type radiation detector for use in
combination with a source of nuclear radiation as a level
sensing gauge, comprising:

an elongated flexible tube having first and second closed
ends and defining therein a scintillation chamber;

liquid scintillation material substantially filling the
scintillation chamber;

said first closed end including a substantially
optically-transparent first end closure member;

photodetection circuitry operably positioned relative to
the first end closure member to quantitatively detect
scintillating photons generated in the scintillation liquid
indicative of radiation passing into the scintillation chamber;

an opaque, flexible protective sheath substantially
surrounding the flexible tube;

further comprising an expansion chamber for accommodating
volumetric expansion of the liquid scintillation material; and

wherein a slidable piston member is operably positioned in
the scintillation chamber to define a variable volume expansion
chamber free of liquid scintillation material adjacent to the
second end.

4. (Original) The detector of claim 3, further comprising
a stiffener to maintain a portion of the scintillation chamber

in which the piston slidably moves to substantially prevent bending thereof.

5. (Original) The detector of claim 3, further comprising a spring positioned to bias the piston toward the scintillation liquid.

6. (Original) The detector of claim 2, wherein the expansion chamber has a fixed volume and is in fluid communication with the scintillation chamber.

7. (Original) The detector of claim 2, wherein the expansion chamber has a variable volume, the chamber being external of and in fluid communication with the flexible tube and including a movable wall therein.

8. (Presently amended) ~~The detector of claim 7,~~ A flexible scintillation-type radiation detector for use in combination with a source of nuclear radiation as a level sensing gauge, comprising:

an elongated flexible tube having first and second closed ends and defining therein a scintillation chamber;

liquid scintillation material substantially filling the scintillation chamber;

said first closed end including a substantially optically-transparent first end closure member;

photodetection circuitry operably positioned relative to the first end closure member to quantitatively detect

scintillating photons generated in the scintillation liquid
indicative of radiation passing into the scintillation chamber;
an opaque, flexible protective sheath substantially
surrounding the flexible tube; and

an expansion chamber for accommodating volumetric expansion
of the liquid scintillation material;

wherein the expansion chamber has a variable volume, the
chamber being external of and in fluid communication with the
flexible tube and including a movable wall therein; and

further comprising a spring means positioned to bias the
movable wall toward the liquid scintillation material.

9. (Presently amended) ~~The detector of claim 7,~~ A
flexible scintillation-type radiation detector for use in
combination with a source of nuclear radiation as a level
sensing gauge, comprising:

an elongated flexible tube having first and second closed
ends and defining therein a scintillation chamber;

liquid scintillation material substantially filling the
scintillation chamber;

said first closed end including a substantially
optically-transparent first end closure member;

photodetection circuitry operably positioned relative to
the first end closure member to quantitatively detect

scintillating photons generated in the scintillation liquid
indicative of radiation passing into the scintillation chamber;

an opaque, flexible protective sheath substantially
surrounding the flexible tube; and

an expansion chamber for accommodating volumetric expansion
of the liquid scintillation material;

wherein the expansion chamber has a variable volume, the
chamber being external of and in fluid communication with the
flexible tube and including a movable wall therein; and

further comprising a member positioned to selectively
immobilize the movable wall in a fixed position.

10. (Original) The detector of claim 1, further comprising
a light reflector substantially surrounding the scintillation
chamber and within the protective sheath.

11. (Original) The detector of claim 10, wherein the light
reflector includes a flexible sheet substantially surrounding
the sidewalls of the flexible tube.

12. (Original) The detector of claim 1, wherein the
photodetection circuitry includes temperature sensing circuitry
that compensates for a shift in the detection of scintillating
photons as a result of temperature variation in the detector.

13. (Cancelled)

14. (New) The detector of claim 1, wherein the protective
sheath has sufficient circumferential rigidity and has an inside

diameter sized sufficiently close to an outside diameter of the flexible tube to prevent kinking of the flexible tube when both are bent together.

15. (New) The detector of claim 14, further comprising a flexible sheet of material substantially surrounding sidewalls of the flexible tube, the sheet of material being sufficiently durable to provide protection from abrasion between the sheath and tube when the detector is bent.